IT IS CLAIMED:

1. Apparatus for use in dispensing a selected volume, in the femtoliter to nanoliter volume range, of each of a plurality of selected liquid samples, comprising

a liquid-support plate having a plurality of liquid-support regions, each capable of supporting a liquid meniscus thereon,

a first electrode containing a plurality of electrode connections, each operatively connected to one of said liquid support region, for electrical contact with a meniscus supported in such region,

a substrate having a first side confronting said plate and an opposite side, and a plurality of sample-holding regions formed in said first side,

a second electrode disposed adjacent one of the two substrate sides, at a spacing from said meniscus of between about 0.1 to 5 mm, and

a control unit including a power source for applying across the two electrodes, a voltage potential having a pulse amplitude or change in pulse amplitude between 0.1-5 kV, and a selected pulse duration in the range 0.1 to 500 msec, thereby to eject a selected volume of the liquid, in the femtoliter to nanoliter volume range, from one or more of said liquid-support regions to one or more of said sample-holding regions.

2. The apparatus of claim 1, wherein said liquid sample is an aqueous, organic, or aqueous/organic sample.

3. The apparatus of claim 2, wherein said organic sample is DMSO.

4. The apparatus of claim 1, wherein said control unit is operable to apply across said first and second electrodes, a voltage potential with a selected pulse duration between about 1-100 msec.

5. The apparatus of claim 1, wherein the spacing between said meniscus and said second electrode is between about 1-3 mm.

6. The apparatus of claim 1, wherein said liquid-support plate and substrate can be positioned with respect to one another to place each liquid-support region in alignment with a corresponding substrate sample-holding region, creating pairs of aligned liquid-support regions and sample regions.

7. The apparatus of claim 6, wherein said second electrode includes a single electrode region which is relatively movable, with respect to said plate and substrate, to place the electrode region adjacent pairs of aligned liquid-support regions and sample regions.

8. The apparatus of claim 7, wherein said control unit is operable to move said electrode region successively to adjacent aligned pairs of liquid-support regions and sample regions, and to apply said voltage potential pulse at each successive aligned pair.

9. The apparatus of claim 6, wherein said second electrode is disposed between said liquid-support plate and substrate, and defines an electrode gap through which a liquid droplet passes when ejected from a liquid-support region to a sample region.

10. The apparatus of claim 6, wherein said liquid-support plate, second electrode and substrate are all independently movable with respect to the other, under the control of said control unit.

11. The apparatus of claim 6, wherein said second electrode includes an electrode plate positioned adjacent the substrate's opposite side, and said control unit is operable to apply a voltage potential to all or a selected one or more of said first-electrode connections.

12. The apparatus of claim 11, wherein said voltage potential is applied to said first-electrode connections simultaneously.

13. The apparatus of claim 11, wherein said voltage potential is applied to said first-electrode connections sequentially.

14. The apparatus of claim 6, wherein said second electrode includes an electrode plate having a plurality of electrode gaps adapted to be positioned with respect to liquid-support plate so as to position each gap in alignment with an associated first-electrode connection.

15. The apparatus of claim 14, wherein said liquid-support plate and said second-electrode plate are relatively movable, as a unit with respect to said substrate.

16. The apparatus of claim 14, wherein said control unit is operable, when the second electrode gaps are positioned between corresponding pairs of aligned liquid-support regions and substrate sample regions, to apply such voltage-potential pulse simultaneously to all or a selected one or more of the aligned first-electrode connections and second-electrode gaps.

17. The apparatus of claim 14, wherein said control unit is operable, when the second electrode gaps are positioned between corresponding pairs of aligned liquid-support regions and substrate sample regions, to apply such voltage-potential pulse sequentially to all or a selected one or more of the aligned first-electrode connections and second-electrode gaps.

18. The apparatus of claim 1, wherein each sample-holding region in said substrate includes a defined-size hydrophilic region surrounded by a hydrophobic surface area.

19. A method of transferring a selected volume, in the femtoliter to nanoliter volume range, of each of a plurality of selected aqueous, organic, or aqueous/organic liquid samples, comprising

adding a liquid sample to one or more of the liquid-support regions in the liquid-support plate in the apparatus of claim 1,

positioning the liquid-support plate with respect to the substrate so as to align one or more of the plate liquid-support regions with one of more of the substrate sample-holding regions,

placing the second electrode in the apparatus adjacent one side of the

substrate, and spaced from the liquid-support regions by about 0.1 to 5 mm, and

applying across the first and second electrodes in the apparatus, a voltage potential having a pulse amplitude or change in pulse amplitude between 0.1-5 kV, and a selected pulse duration in the range 0.1 to 500 msec, thereby to eject a selected volume of the liquid, in the femtoliter to nanoliter volume range, from one or more of said liquid-support regions to one or more of said sample-holding regions.

20. The method of claim 19, wherein said applying is with a selected pulse duration between about 1-100 msec.

21. The method of claim 19, wherein said placing includes placing the second electrode about 1-3 mm from said meniscus.

22. The method of claim 19, wherein said positioning is effective to place each liquid-support region in alignment with a corresponding substrate sample region, creating pairs of aligned liquid-support regions and sample regions.

23. The method of claim 22, wherein the second electrode includes a single electrode which is relatively movable, with respect to said plate and substrate, to place the electrode adjacent pairs of aligned liquid-support regions and sample regions, and said placing and applying is effective to move the second electrode successively to adjacent aligned pairs of liquid-support regions and sample regions, and to apply said voltage potential pulse at each successive aligned pair.

24. The method of claim 19, wherein said second electrode is disposed between said plate and substrate, and defines an electrode gap through which a liquid droplet passes when ejected from a liquid-support region.

25. The method of claim 19, wherein the second electrode includes an electrode plate positioned adjacent the substrate opposite side, and said applying is operable to apply a voltage potential to all or a selected one or more of the first-electrode connections.

26. The method of claim 22, wherein said second electrode includes an electrode plate having a plurality of electrode gaps adapted to be positioned with respect to liquid-support plate so as to position each gap in alignment with an associated first-electrode connection, and said applying is effective to apply said voltage potential to a selected one or more of said first-electrode connections.

27. The method of claim 19, wherein said applying is operable to simultaneously eject a sample from one or more of the plurality of liquid-support regions to the corresponding aligned sample-holding region or regions.

28. The method of claim 19, wherein said applying is operable to sequentially eject a sample from one or more of the plurality of liquid-support regions to the corresponding aligned sample-holding region or regions.